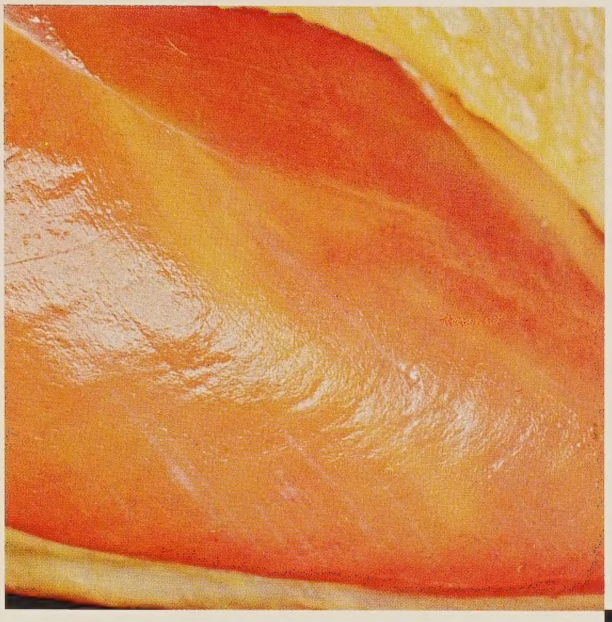
United States Department of Agriculture
Food Safety and Inspection Service
Technical Services
Program Training Division



GUIDELINES FOR LEUKOSIS DISPOSITION

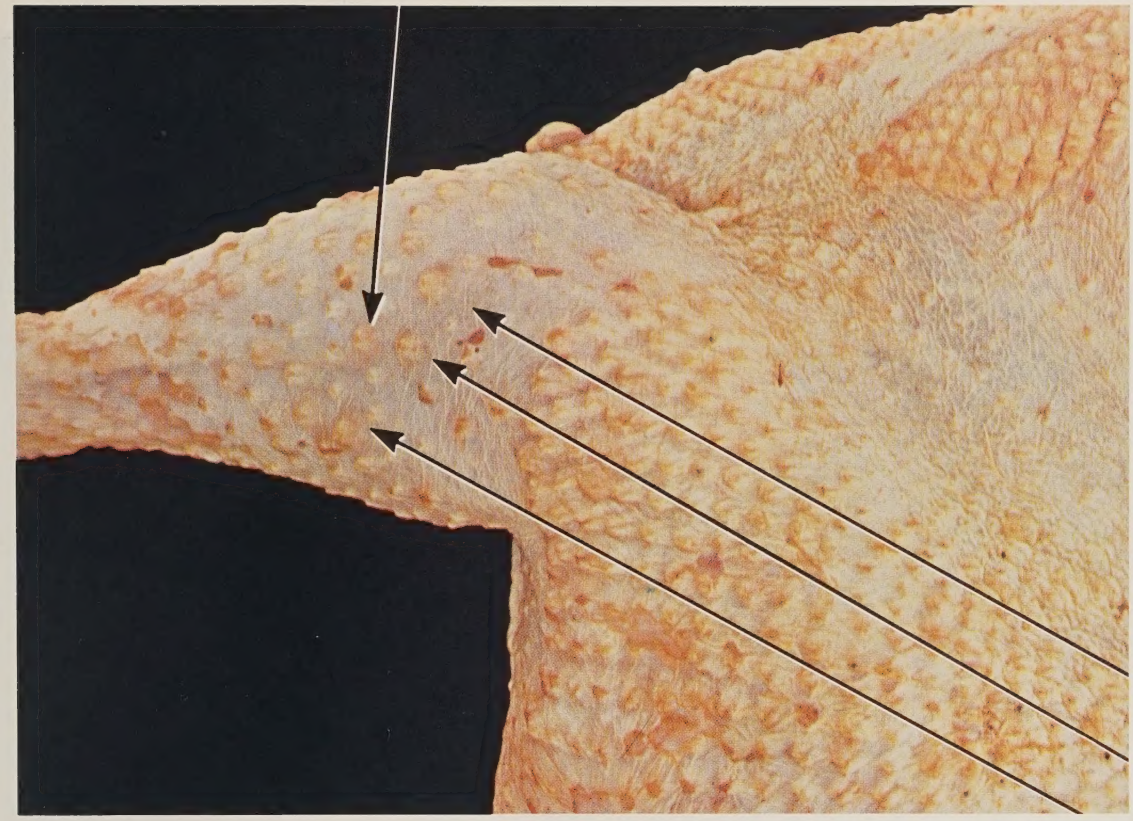
GUIDELINES

for

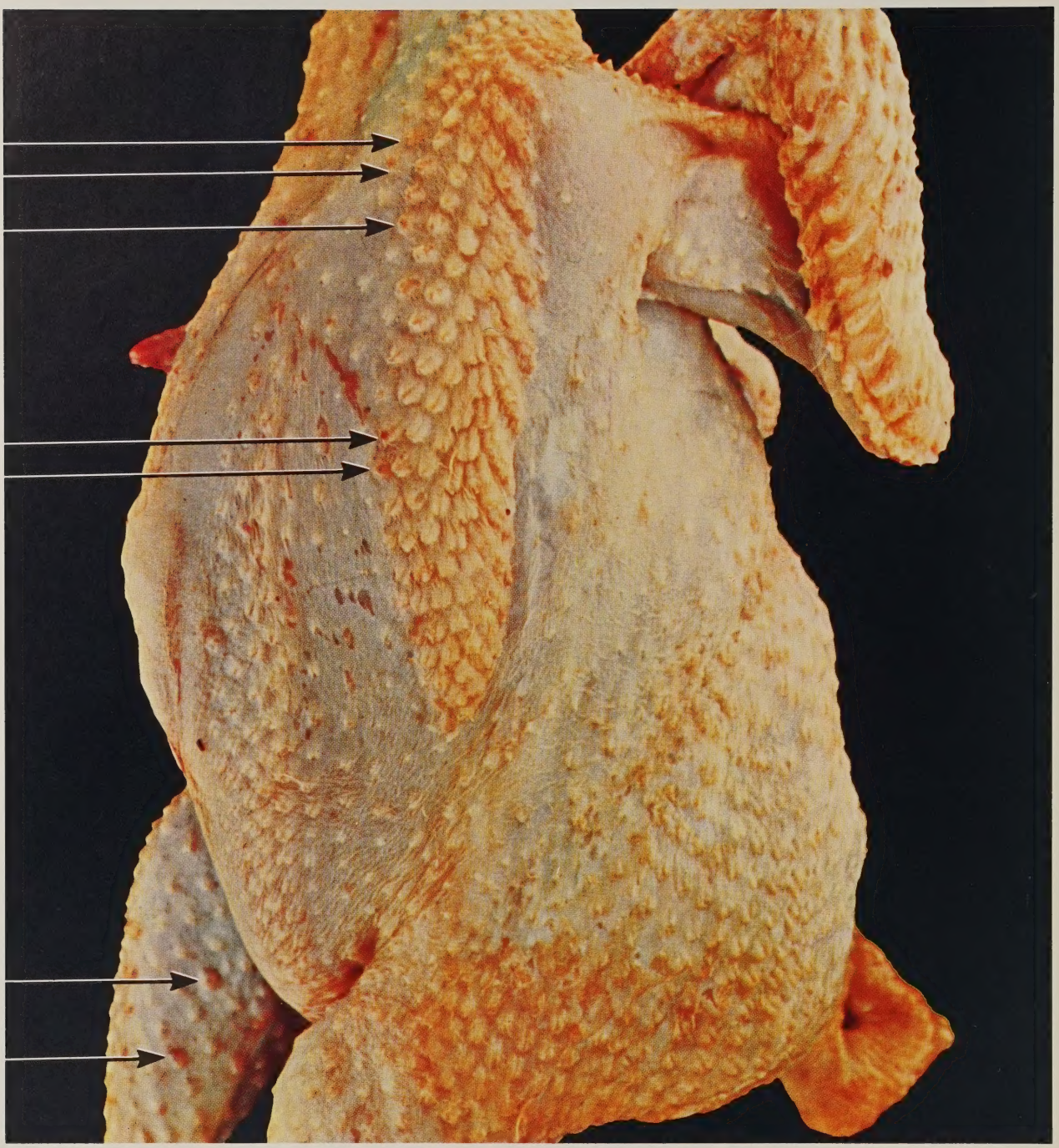
LEUKOSIS DISPOSITIONS

UNITED STATES DEPARTMENT OF AGRICULTURE

(Fig. 1) The feather follicles in the feather tract are close together and are arranged in rows. Any four adjacent follicles when looked at separately will be in a diamond shape. The feather follicles on the rest of the carcass may be larger or smaller but they are arranged in rows and any four adjacent follicles, when viewed separately resemble a diamond. There may be a slight variation in the size of feather follicles within an area of skin.

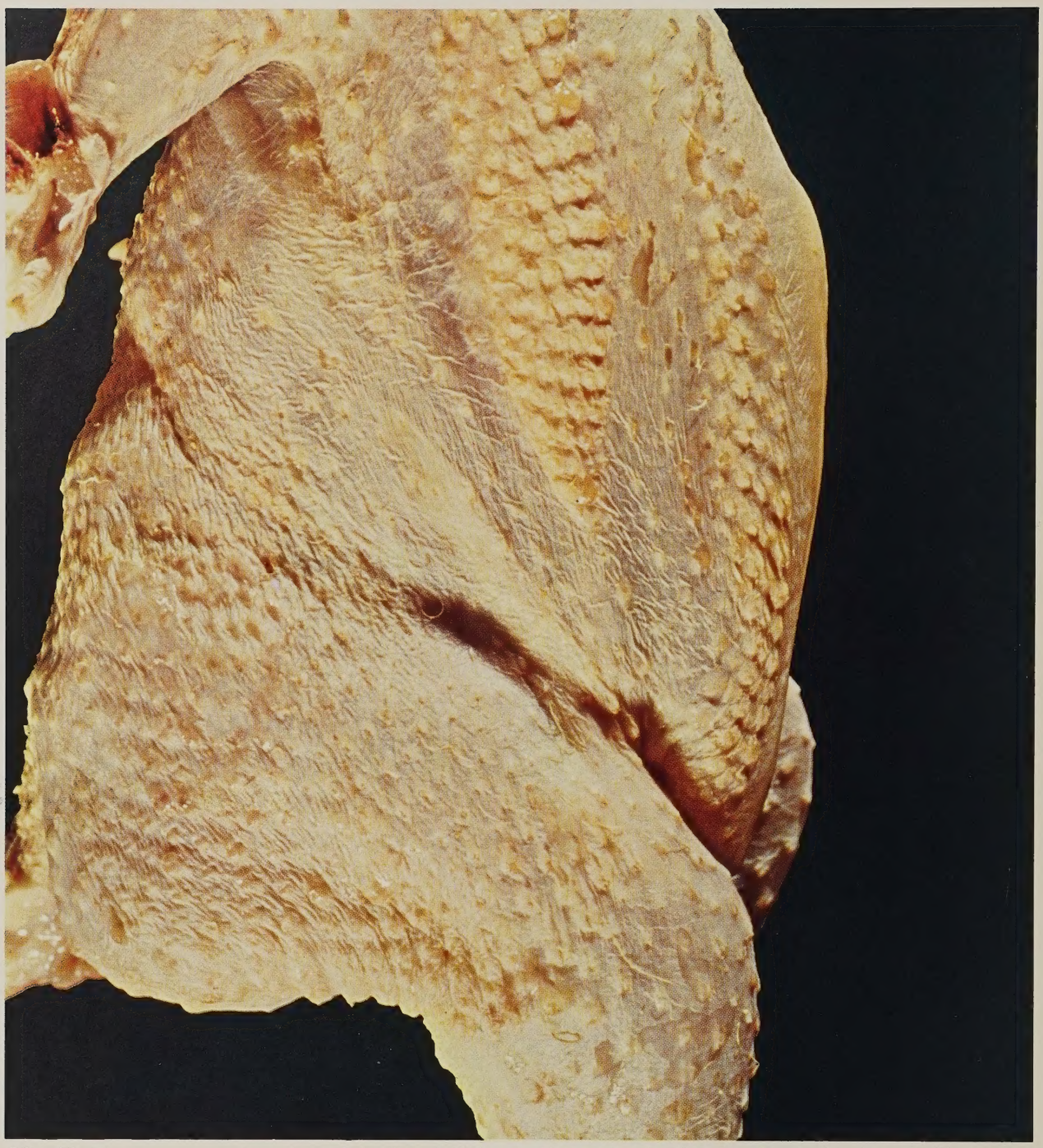


(Fig. 2) There are enlarged follicles scattered throughout the feather tracts on the drumstick accompanied by yellowish discoloration of follicles on the edge of the breast feather tracts. Carcasses with lesions similar to this should be retained for veterinary review.



(Fig. 3) There are some discolored feather follicles on the periphery of the large feather tract on the breast. There are discolored, slightly enlarged feather follicles on the drumstick. Poultry inspectors should retain carcasses of this type for veterinary review. Enlargement of feather follicles in more than one feather tract is considered diagnostic for leukosis.

(Fig. 4) In addition to yellowish discoloration approximately one-third of the feather follicles in the large feather tract on the breast are enlarged. Poultry inspectors should retain carcasses for veterinary review when feather follicles in a single feather tract are enlarged. Enlargement of feather follicles dispersed throughout more than one feather tract is considered diagnostic for leukosis.



(Fig. 5) There are grossly enlarged feather follicles in the major feather tracts on the breast. These are obvious lesions of leukosis.

(Fig. 6) There is discoloration and enlargement of feather follicles dispersed throughout the major feather tracts on the breast and neck and other areas. These are obvious lesions of leukosis.

(Fig. 7) This carcass shows advanced tumor formation scattered throughout the feather follicles on the breast. These are obvious lesions of leukosis.

(Fig. 8) Approximately 80 percent of the feather follicles in the feather tract on the breast show a reddish discoloration of an inflammatory process. Carcasses similar to this may be passed by a fully trained poultry inspector after removal of the affected portions of the skin.

(Fig. 9) Normal leg. Some variation of size of feather follicles may be expected in normal chickens.

(Fig. 10) There is some discoloration of approximately 50 percent of the feather follicles on the drumstick. Poultry inspectors should retain birds such as this for veterinary review. Discoloration of feather follicles without enlargement is not considered diagnostic for leukosis.

(Fig. 11) On close examination feather follicles affected with leukosis are enlarged, less pointed, and more mound shaped than are normal follicles.

(Fig. 12) The outermost layer of the skin contains most of the yellow pigment. This pigmented layer of skin masks the discoloration of abnormal feather follicles. When the outermost layer of skin is removed from feather follicles affected with leukosis the contrast between the diseased follicle and the normal skin is increased. Therefore, diseased feather follicles are easier to see when the outermost layers of skin are removed from them. Many of the enlarged follicles on this drumstick appear to glisten because of "barking." Gross enlargement and discoloration of feather follicles on both the drumstick and thigh are obvious lesions of leukosis.

(Fig. 13) There are grossly enlarged feather follicles on the inside surface on the drumstick. These are obvious lesions of leukosis.

(Fig. 14) Gross enlargement of the feather follicles on the outside surface of the drumstick and thigh. These are obvious lesions of leukosis.

(Fig. 15) There is an enlargement and a discoloration of feather follicles scattered throughout the feather tract on both the drumstick and thigh. These obvious lesions are considered diagnostic for leukosis.

(Fig. 16) Normal appearance of the skin on the back of the neck.

(Fig. 17) There is some discoloration on a few feather follicles on the back of the neck. This is not considered diagnostic for leukosis, if it is the only lesion seen on the carcass.

(Fig. 18) There is discoloration and gross enlargement of feather follicles throughout the feather tracts on the back of the neck. These obvious lesions are considered diagnostic for leukosis.

(Fig. 19) Approximately 50 percent of the feather follicles on the neck and back are grossly enlarged and tumorous. These obvious lesions are considered diagnostic for leukosis.

(Fig. 20) Severe skin form of leukosis on the back of the neck. (From same carcass shown in Fig. 7)

(Fig. 21) This photograph shows enlarged feather follicles characteristic of skin leukosis. However, the tumorous feather follicles are accompanied by hemorrhage. This does not occur frequently, but an inspector should be aware that skin leukosis and hemorrhage can occur together.

(Fig. 22) Sometimes chickens are exposed to irritating substances in the litter, such at fuel oil. When this occurs it causes a long lasting mild inflammation of the skin. In this photograph there is a group of uniformly enlarged feather follicles accompanied by reddish discoloration. The important feature in separating this condition from leukosis is that the skin between the feather follicles is red, swollen, and inflamed. In leukosis, except in very advanced cases, only the feather follicle itself is involved with the disease.

The typical picture of skin leukosis is the presence of enlarged feather follicles dispersed among normal follicles often disrupting their normal pattern. If the superficial layer of skin is removed in the picking process (barking) the enlarged feather follicles are easier to see.

Poultry inspectors should retain for veterinary review all carcasses in which there is only a discoloration of feather follicles and all carcasses in which the feather follicle enlargement is confined to a single skin area. Reddish or yellowish discoloration of feather follicles in the absence of feather follicle enlargement should not be considered diagnostic for leukosis. Feather follicle enlargement which is confined to a single area of the skin and which *is not dispersed* throughout a feather follicle tract should not be considered diagnostic for leukosis.

(Fig. 23) The normal immature chicken ovary has a pale yellow color and is incompletely divided into parts by crevices and fissures. The immature ovary has a granular feel when rubbed with the finger.

(Fig. 24) Except for increased thickness in the area of tumors this ovary is almost normal size. Approximately 30 percent of the ovary is replaced by a smooth more intensely yellow tissue. This new tissue lacks the granularity of the normal ovary and only the very deep fissures remain. This is a typical leukosis tumor in the ovary.

(Fig. 25) Almost all of this ovary is involved with tumor tissue. Only the very deep crevices and a few ovarian follicles remain. This is four to six times as large as a normal ovary and is an obvious lesion of leukosis.

(Fig. 26) There are three small abnormal projections from this otherwise normal immature ovary. Carcasses affected with lesions such as this should be retained for veterinary review, unless typical leukosis lesions are present in other organs.

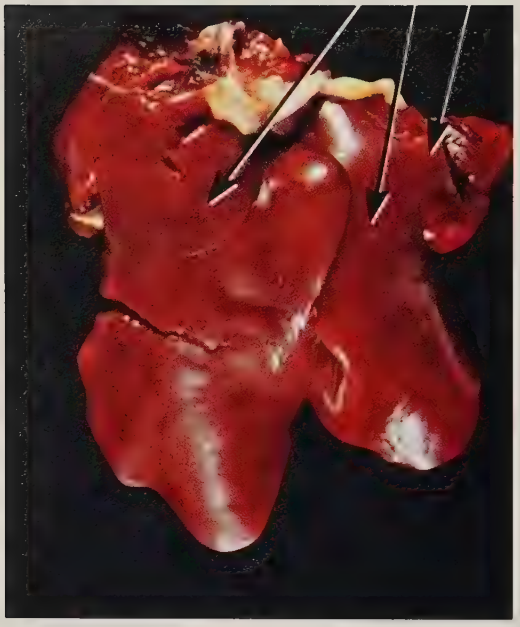
(Figs. 27 and 28) Testicles in young chickens are elongated and pale yellow in color. There may be a slight variation in size when the testicle on one side is compared with the testicle on the other. There may be a very large variation in the size of testes when one chicken is compared with another.

(Fig. 29) Usually only one testicle of a pair is affected with leukosis. The tumors may produce a profound change in the size, shape, and texture of the affected testicle. There is a slight difference in color between normal and leukotic tissue; this is illustrated in the front part of the left testicle which is enlarged and lighter colored. Birds with changes in the testicle, similar to those illustrated in this photograph should be retained for veterinary review unless there is a more typical lesion in another tissue in the carcass.

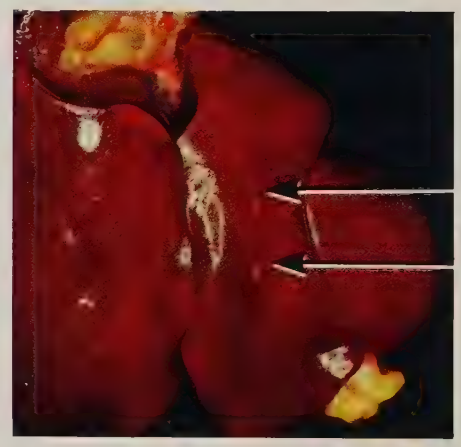
(Fig. 30) Leukosis tumors have caused obvious enlargements and deformations in the testes in this photograph.

(Fig. 31) Typical leukosis tumors in the testes with concommitant lesions in the kidneys. These are well-developed, obvious lesions of leukosis.

Leukosis tumors in the liver and other internal organs may vary from pinpoint size to tumors which replace most of the normal tissues. At post-mortem inspection the leukosis tumors in soft tissue are pearly white and have a definite line of demarcation from normal tissues. However, the entire organ may be enlarged, lighter colored than normal, and have no definite tumor formation. Sometimes the smaller discrete tumors in soft tissue organs such as the liver, kidney, and spleen cannot be seen because they are confined to deeper tissues.



(Figs. 32, 33 and 34) These three livers contain a variety of small white spots. None of these spots are considered typical leukosis tumors. Unless there are other more typical leukosis tumors in other tissues poultry inspectors should retain carcasses with lesions of this type for veterinary review. Small white spots in the liver that have a yellowish discoloration, or that do not have a definite border are not considered specific enough to warrant a diagnosis of leukosis based on that evidence alone.



(Fig. 35) There are four well developed leukosis tumors close to the surface of the liver, and two other tumors deeper in the liver tissue. These lesions are pearly white, glistening, and have discrete borders. These are typical leukosis tumors in the liver.

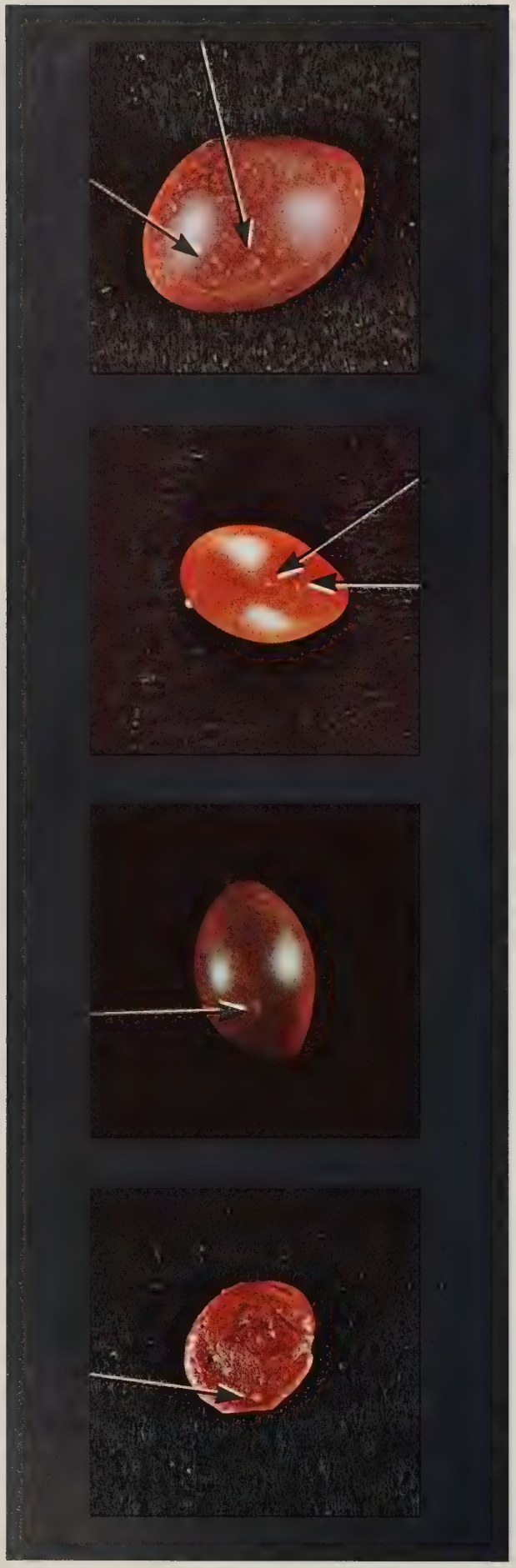
(Fig. 36) There are many very small yellowish white spots in this liver that do not have discrete borders. This is not considered typical of leukosis. On microscopic examination this proved to be focal to diffuse nonsuppurative hepatits. Birds with lesions similar to this should be retained for veterinary review.

In all pictures of whole spleens you will notice two glare spots on the surface of the spleen. These are light reflections and should be disregarded in evaluating photographs of the spleen.

In young chickens normal spleens are reddish purple. They are uniformly soft textured and are oval to round.

(Fig. 37) Many normal spleens have slightly mottled surfaces. Spleens with interconnecting small white lines on their surface are considered normal and carcasses with these spleens should be passed as wholesome.

(Fig. 38) Many spleens have a heavier degree of mottling in which the white colored areas are better defined, but no definite tumor formations are yet seen. Carcasses with this type of spleen should be retained by poultry inspectors for veterinary review. Spleens with heavy mottling are not specific lesions for the avian leukosis complex



(Fig. 39) Any abnormal or severe condition such as heat, extreme cold, starvation, or disease causes a reaction in the spleen. This sometimes results in an enlargement of the spleen and in all cases an increase in protective cells in the red pulp of the spleen. These appear as uniform, small white spots throughout the spleen. This is considered to be a normal reaction and should be used to judge the disposition of a carcass only when present with other conditions.

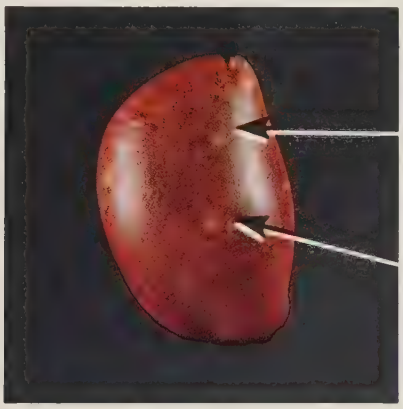
(Fig. 40) There is an intense mottling of the spleen with two clearly defined whitish areas. Birds found with this lesion only shall be retained for veterinary review. This particular bird also had a small ovarian tumor and was condemned for leukosis.

(Fig. 41) This spleen contains one small pearly white nodule with a discrete border. Carcasses with lesions such as this should be retained for veterinary review.

(Fig. 42) Further examination of the spleen shown in figure 41 revealed another small discrete leukosis tumor deeper in the spleen tissue. The additional information gained by the further examination of this carcass warrants its condemnation.

(Fig. 43) This spleen is enlarged and misshaped. But, there are no definite leukosis tumors visible. It is important that any spleens that are enlarged or misshapened be palpated. Palpation of this spleen revealed a large hard mass.

(Fig. 44) This is a photograph of the leukosis tumor hidden in the spleen pictured in figure 43.



(Fig. 45 and 46) These two spleens reveal variations in the appearance of typical obvious leukosis tumors in the spleen.

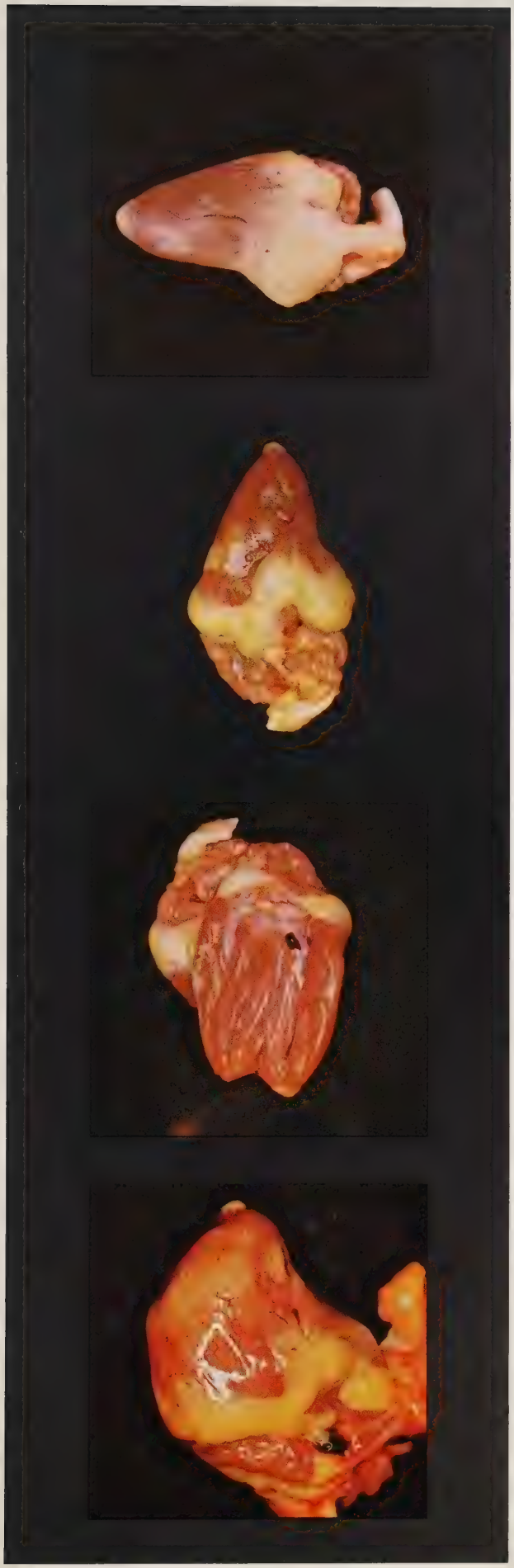
(Fig. 47) Granulomas in the spleen are yellowish white nodules. They have a ragged edge but are separated from normal spleen by a distinct line of demarcation. This lesion may be separated from leukosis tumors by noting the ragged edge and the slight yellow color. Veterinarians may cut through the center of these nodules and find a tiny yellow core in the center. Carcasses having only granulomas in the spleen may be passed as wholesome after thorough examination by a veterinary inspector.

Kidneys are surrounded by muscle and fat and pelvic bones so that only about one-fourth of the surface is exposed for examination. Leukosis tumors near the exposed surface of the kidney are very similar in appearance to the tumors in the liver and spleen. Sometimes a leukosis tumor located deep in the kidneys causes a protuberance on the exposed surface.

(Fig. 48) Kidney lesions may be hidden by the esophagus or proventriculus if the carcass is improperly drawn.

(Fig. 49) This photograph illustrates the same kidney as figure 48. A well-developed leukosis tumor in the kidney is revealed by removing the proventriculus.

(Fig. 50) Approximately 30 percent of the visible kidney tissue is replaced by typical leukosis tumors. This is the same specimen as figure 31.



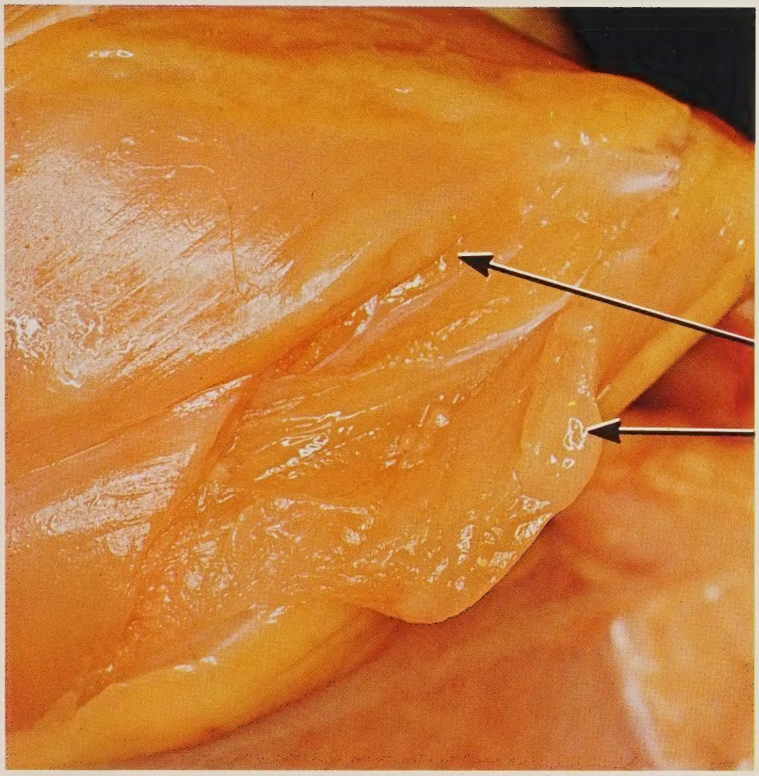
(Fig. 51) Normal heart.

(Fig. 52) Shows a well-developed, irregularly shaped leukosis tumor in the heart muscle adjacent to the band of fat around the heart.

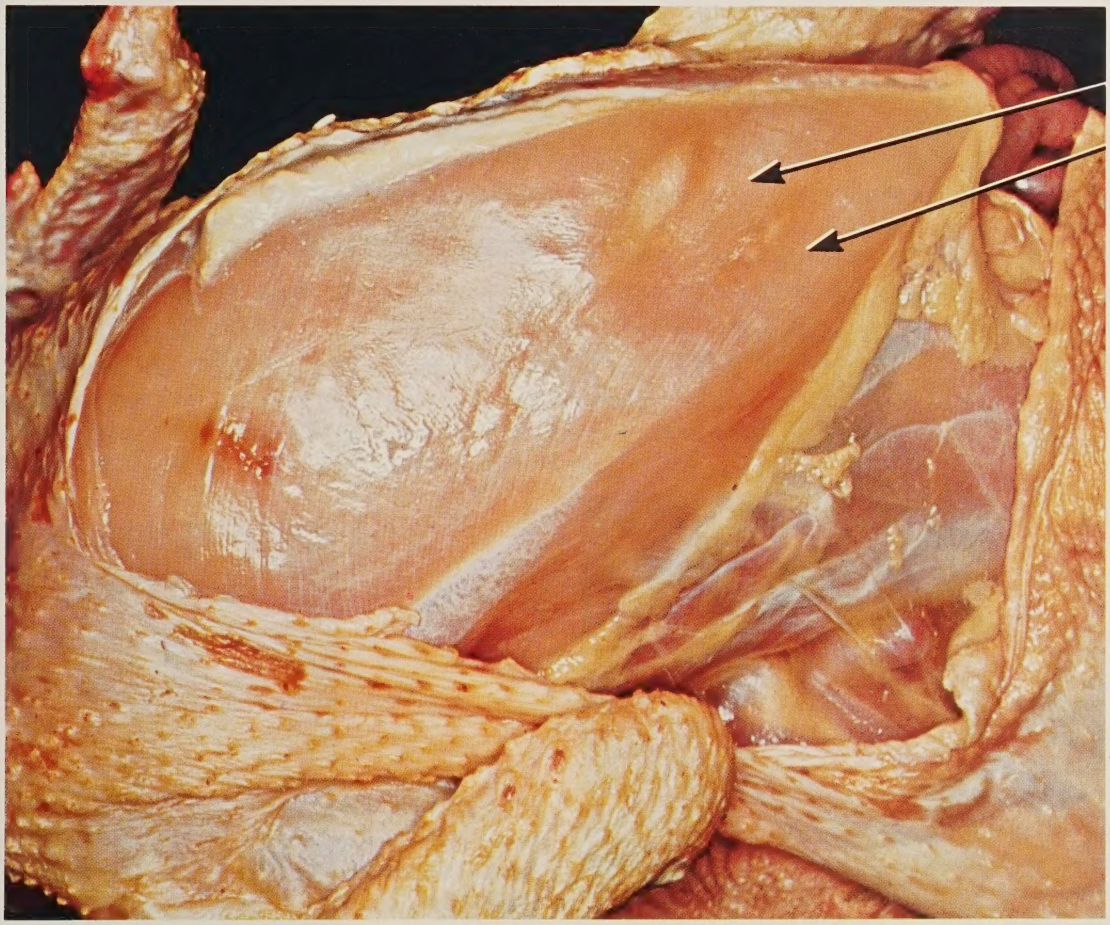
(Fig. 53) This is a section through the heart in figure 52, showing the extension of the leukosis tumor deeply into the heart muscle. These lesions are obvious leukosis tumors.

(Fig. 54) This is a heart with extensive invasion by leukosis tumors.

(Fig. 55) There are two small, oval, yellowish-white nodules in the breast muscle.

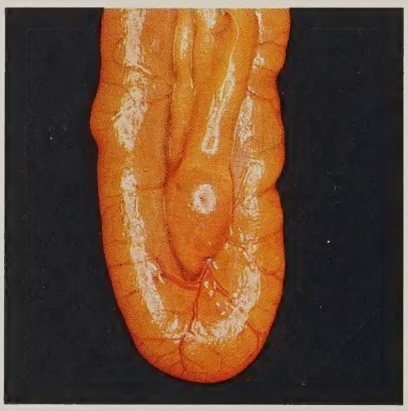


(Fig. 56) Shows the appearance of these tumors after they have been cut through.



(Fig. 57) Shows another typical leukosis tumor in muscle which does not protrude above the surface which is a yellowish white in color and is surrounded by a zone of reddish yellow discoloration. The lesions shown in figures 55, 56, and 57 are well-developed, obvious tumors of leukosis.

(Fig. 58) Occasionally vitamin deficiency and mineral deficiency or both in combination may produce a degeneration of muscle bundles or fibers. These appear as yellowish-white streaks that involve a muscle fiber or bundle throughout its entire length. There is no reddish discoloration surrounding these lesions and they do not protrude above the surface. If the condition is long standing, there may be a wasting away of the muscle. Carcasses having lesions of this type must be retained for veterinary review. A localized degeneration of muscle tissue does not warrant condemnation of the entire carcass.



(Fig. 59) Leukosis tumors in the pancreas are rarely seen without tumors in other tissues or organs. Carcasses with lesions in the pancreas only should be retained for veterinary review.

(Fig. 60) Osteopetrosis is a virus disease of chickens causing an abnormality in the midshaft portion of long bones. Involvement of the bone of the drumstick can be found by feeling for the sharp edge on the front of the bone. Osteopetrosis tends to make this sharp edge round. In advanced cases the entire bone is thickened. The bone on the right is a normal drumstick bone. The bone tapers from each end toward midshaft. Osteopetrosis has rounded the sharp crest of the drumstick bone on the left and has made the midshaft portion more yellow and slightly thicker than normal.

(Fig. 61) The normal bone is on the right. Note the difference in the fractures. The bone with osteopetrosis is broken off more squarely than is the normal bone.

(Fig. 62) The end view of the midshaft portion of a bone affected with osteopetrosis and a normal bone. The normal bone is on the right. The cortex or shell of the osteopetrosis bone is greatly thickened and yellow white in color. Much of the marrow in the center is replaced by abnormal bone. Osteopetrosis illustrated in figures 60 61, and 62 are sufficiently developed to warrant condemnation by fully trained poultry inspectors. Less developed or doubtful cases shall be retained for review by a veterinary inspector.

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